

## REMARKS

Claims 1-25 are pending and under consideration. In the Office Action of August 17, 2005, the Examiner made the following disposition:

- A.) Rejected claims 1 and 14 under 35 U.S.C. §102(b) as being allegedly anticipated by *Hayashi*.
- B.) Rejected claims 4, 5, 20, and 21 under 35 U.S.C. §102(b) as being allegedly anticipated by *Merrill*.
- C.) Rejected claim 10 under 35 U.S.C. §102(b) as being allegedly anticipated by *Gaboury, et al.*
- D.) Rejected claims 2 and 15 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Hqyashi* in view of *Merrill*.
- E.) Rejected claims 3 and 16 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Hayashi* in view of *Burr, et al.*
- F.) Rejected claims 6 and 22 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Merrill* in view of *Matsumoto*.
- G.) Rejected claims 7-9 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Merrill* in view of *Nakagawa*.
- H.) Rejected claims 11-13 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Gaboury* in view of *Nakagawa*.
- I.) Rejected claim 17 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Hayashi* in view of *Isogai, et al.*
- J.) Rejected claim 18 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Hayashi* in view of *Suzuki*.
- K.) Rejected claim 23 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Merrill* in view of *Isogai, et al.*
- L.) Rejected claim 24 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Merrill* in view of *Suzuki*.
- M.) Objected to claims 19 and 25.

Applicants respectfully traverse the rejections and address the Examiners disposition below.

A.) Rejection of claims 1 and 14 under 35 U.S.C. §102(b) as being allegedly anticipated by *Hayashi*:

Applicants respectfully disagree with the rejection.

Claim 1, as amended, claims a solid-state image pickup device including pixels each of which comprises a photodiode, a detection portion and a transfer transistor for transferring electrons accumulated in the photodiode to the detection portion. The gate voltage of the transfer transistor when the electrons are accumulated in said photodiode is set to a negative voltage.

Claim 14, as amended, claims a method of driving a solid-state image pickup device including pixels each of which comprises a photodiode, a detection portion and a transfer transistor for transferring electrons accumulated in the photodiode to the detection portion, wherein the gate voltage of said transfer transistor when the electrons are accumulated in said photodiode is set to a negative voltage.

Claims 17-19 have been amended to correct informalities.

This is clearly unlike *Hayashi*. To begin with, claims 1 and 14 each claim that a gate voltage of a transfer transistor is set to a negative voltage, when electrons are accumulated in a photodiode. Unlike claims 1 and 14, *Hayashi's* transistor is not used for the transfer of an accumulated charge. (See, *Hayashi*, Figures 10A and 10B; 1:47-66). As described in *Hayashi*, *Hayashi* automatically moves charges to a channel under its gate PG. *Id.* Thus, for at least this reason, *Hayashi* fails to disclose or suggest claims 1 and 14.

Further, unlike claims 1 and 14, *Hayashi* fails to disclose or suggest that the charges accumulated and used for detection are electrons. Instead, *Hayashi's* employs holes. For at least this additional reason, *Hayashi* fails to disclose or suggest claims 1 and 14.

Claims 2-3, 7-9, and 15-19 depend directly or indirectly from claim 1 or 14 and are therefore allowable for at least the same reasons that claims 1 and 14 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

B.) Rejection of claims 4, 5, 20, and 21 under 35 U.S.C. §102(b) as being allegedly anticipated by *Merrill*:

Applicants respectfully disagree with the rejection.

Claim 4, as amended, claims a solid-state image pickup device including pixels each of which comprises a photodiode, a detection portion and a transfer transistor for transferring holes

accumulated in the photodiode to the detection portion, wherein the gate voltage of said transfer transistor when the holes are accumulated in said photodiode is set to a positive voltage.

Claim 20, as amended, claims a method of driving a solid-state image pickup device including pixels each of which comprises a photodiode, a detection portion and a transfer transistor for transferring holes accumulated in the photodiode to the detection portion, wherein the gate voltage of said transfer transistor when the holes are accumulated in said photodiode is set to a positive voltage.

Claims 23-25 have been amended to correct informalities.

This is clearly unlike *Merrill*, which fails to disclose or suggest accumulating holes. *Merrill* clearly teaches accumulating electrons under its electrode, instead of holes, when its photo-gate structure is set to a positive voltage. For at least this reason, *Merrill* fails to disclose or suggest claims 4 and 20.

Claims 5-9 and 21-25 depend directly or indirectly from claim 4 or 20 and are therefore allowable for at least the same reasons that claims 4 and 20 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

C.) Rejection of claim 10 under 35 U.S.C. §102(b) as being allegedly anticipated by *Gaboury, et al.*:

Applicants respectfully disagree with the rejection.

Claim 10, as amended, claims a solid-state image pickup device including pixels each of which comprises a photodiode, a detection portion and a transfer transistor for transferring charges accumulated in said photodiode to said detection portion, wherein an overflow path for discharging charges overflowing from said photodiode is formed in a bulk out of a channel portion of said transfer transistor and discharges the charges in a depth direction of a substrate.

This is clearly unlike *Gaboury*, which fails to disclose or suggest discharging in a depth direction of a substrate. Referring to *Gaboury* Figure 1 and 2:52-67, *Gaboury* clearly discloses a horizontal overflow drain structure, instead of a vertical overflow drain structure. Thus, for at least this reason, *Gaboury* fails to disclose or suggest claim 10.

Claims 11-13 depend directly or indirectly from claim 10 and are therefore allowable for at least the same reasons that claim 10 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

D.) Rejection of claims 2 and 15 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Hayashi* in view of *Merrill*:

Applicants respectfully disagree with the rejection.

Independent claims 1 and 14 are allowable over *Hayashi* as discussed above. *Merrill* still fails to disclose or suggest that a gate voltage of a transfer transistor is set to a negative voltage, when electrons are accumulated in a photodiode. Thus, *Hayashi* in view of *Merrill* still fails to disclose or suggest claims 1 and 14.

Claims 2 and 15 depend directly or indirectly from claim 1 or 14 and are therefore allowable for at least the same reasons that claims 1 and 14 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

E.) Rejection of claims 3 and 16 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Hayashi* in view of *Burr, et al.*:

Applicants respectfully disagree with the rejection.

Independent claims 1 and 14 are allowable over *Hayashi* as discussed above. *Burr* still fails to disclose or suggest that a gate voltage of a transfer transistor is set to a negative voltage, when electrons are accumulated in a photodiode. Thus, *Hayashi* in view of *Burr* still fails to disclose or suggest claims 1 and 14.

Claims 3 and 16 depend directly or indirectly from claim 1 or 14 and are therefore allowable for at least the same reasons that claims 1 and 14 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

F.) Rejection of claims 6 and 22 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Merrill* in view of *Matsumoto*:

Applicants respectfully disagree with the rejection.

Independent claims 4 and 20 are allowable over *Merrill* as discussed above. *Matsumoto* still fails to disclose or suggest that a gate voltage of a transfer transistor, when holes are

accumulated in a photodiode, is set to a positive voltage. Thus, *Merrill* in view of *Matsumoto* still fails to disclose or suggest claims 4 and 20.

Claims 6 and 22 depend directly or indirectly from claim 4 or 20 and are therefore allowable for at least the same reasons that claims 4 or 20 are allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

G.) Rejection of claims 7-9 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Merrill* in view of *Nakagawa*:

Applicants respectfully disagree with the rejection.

Independent claim 4 is allowable over *Merrill* as discussed above. *Nakagawa* still fails to disclose or suggest that a gate voltage of a transfer transistor, when holes are accumulated in a photodiode, is set to a positive voltage. Thus, *Merrill* in view of *Nakagawa* still fails to disclose or suggest claim 4.

Claims 7-9 depend directly or indirectly from claim 4 and are therefore allowable for at least the same reasons that claim 4 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

H.) Rejection of claims 11-13 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Gaboury* in view of *Nakagawa*:

Applicants respectfully disagree with the rejection.

Independent claim 10 is allowable over *Gaboury* as discussed above. *Nakagawa* still fails to disclose or suggest in a depth direction of a substrate. Thus, *Gaboury* in view of *Nakagawa* still fails to disclose or suggest claim 10.

Claims 11-13 depend directly or indirectly from claim 10 and are therefore allowable for at least the same reasons that claim 10 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

I.) Rejection of claim 17 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Hayashi* in view of *Isogai, et al.*:

Applicants respectfully disagree with the rejection.

Independent claim 14 is allowable over *Hayashi* as discussed above. *Isogai* still fails to disclose or suggest that a gate voltage of a transfer transistor is set to a negative voltage, when electrons are accumulated in a photodiode. Thus, *Hayashi* in view of *Isogai* still fails to disclose or suggest claim 14.

Claim 17 depends directly or indirectly from claim 14 and is therefore allowable for at least the same reasons that claim 14 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

J.) Rejection of claim 18 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Hayashi* in view of *Suzuki*:

Applicants respectfully disagree with the rejection.

Independent claim 14 is allowable over *Hayashi* as discussed above. *Suzuki* still fails to disclose or suggest that a gate voltage of a transfer transistor is set to a negative voltage, when electrons are accumulated in a photodiode. Thus, *Hayashi* in view of *Suzuki* still fails to disclose or suggest claim 14.

Claim 18 depends directly or indirectly from claim 14 and is therefore allowable for at least the same reasons that claim 14 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

K.) Rejection of claim 23 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Merrill* in view of *Isogai, et al.*:

Applicants respectfully disagree with the rejection.

Independent claim 20 is allowable over *Merrill* as discussed above. *Isogai* still fails to disclose or suggest that a gate voltage of a transfer transistor, when holes are accumulated in a photodiode, is set to a positive voltage. Thus, *Merrill* in view of *Isogai* still fails to disclose or suggest claim 20.

Claim 23 depends directly or indirectly from claim 20 and is therefore allowable for at least the same reasons that claim 20 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

L.) Rejection of claim 24 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Merrill* in view of *Suzuki*:

Applicants respectfully disagree with the rejection.

Independent claim 20 is allowable over *Merrill* as discussed above. *Suzuki* still fails to disclose or suggest that a gate voltage of a transfer transistor, when holes are accumulated in a photodiode, is set to a positive voltage. Thus, *Merrill* in view of *Suzuki* still fails to disclose or suggest claim 20.

Claim 24 depends directly or indirectly from claim 20 and is therefore allowable for at least the same reasons that claim 20 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

M.) Objection to claims 19 and 25:


Applicants respectfully acknowledge the Examiner's finding of allowable subject matter in claims 19 and 25. Independent claims 14 and 20 are allowable as discussed above. Claims 19 and 25 depend directly or indirectly from claim 14 or 20 and are therefore allowable for at least the same reasons that claims 14 and 20 are allowable.

Applicants respectfully submit the objection has been overcome and request that it be withdrawn.

CONCLUSION

It is submitted that claims 1-25 are patentable and that the application is in condition for allowance. Notice to that effect is requested.

Respectfully submitted,

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